



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,445	05/19/2008	Massimo Morbidelli	635.43890X00	5046
20457 7590 11/22/2010 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873				
EXAMINER NGUYEN, HUY TRAM				
ART UNIT		PAPER NUMBER		
1774				
MAIL DATE		DELIVERY MODE		
11/22/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/567,445

**Applicant(s)**

MORBIDELLI ET AL.

**Examiner**

HUY-TRAM NGUYEN

**Art Unit**

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 May 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-19 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 07 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/GS-08)  
Paper No(s)/Mail Date 2/7/06 & 6/23/06  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claims 1 and 13 are objected to because of the following informalities: On Line 2, remove the word "and" and add a comma "," after "vessel-like member"; On Line 5, remove period "." after the word "which". Appropriate correction is required.
2. Claim 4 is objected to because of the following informalities: On Line 4 of Claim 5, remove the hyphen "-" after the words "elliptic", "triangle", and "square"; and replace the word "and" on Line 5 with "or".
3. Claim 5 is objected to because of the following informalities: typo "arid/or", replace with "and/or" and replace the word "and" on Line 4 with "or". Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 6, 7, 13, 14, 16, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by **Arto Edward Papzian ( Papzian - GB 2 103 229 A)**.

Regarding Claim 1, Papzian reference discloses a reactor and/or mixing vessel comprising at least

an outer in a direction extending vessel-like member (**Figure 1, numeral 1**),

an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction (**Figures 1&2, numeral 3 and Page 2, Lines 20-42**), and

at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel (**Figure 1, numerals 10 and 13**).

Regarding Claim 2, Papzian reference discloses the reactor and/or mixing vessel according to claim 1, wherein the outer member is a cylinder having a cross-section of circular shape and the inner member does have a cross-section of non-circular shape (**Figure 2, numerals 1-outer member and 3 – inner member**).

Regarding Claim 3, Papzian reference discloses the reactor and/or mixing vessel according to claim 1, wherein the inner member is adapted for rotation with respect to the outer member (**Page 2, Lines 20-42**).

Regarding Claim 4, Papzian reference discloses the reactor and/or mixing vessel according to claim 1, wherein the at least one member having a cross-section of non-circular shape has a shape selected from the group consisting of an elliptic, a triangle, a square and a polygon-like shape, said shape having rounded off edges (**Figure 2, numeral 3 – hexagonal and Page 2, Lines 14-19 - smooth edges**).

Regarding Claim 6, Papzian reference discloses the reactor and/or mixing vessel according to claim 1, wherein both members are adapted for rotation in opposite direction (**Page 1, Lines 29-37 and 49-53**).

Regarding Claim 7, Papzian reference discloses the reactor and/or mixing vessel according to claim 1, wherein the two members are arranged concentrically (**Figure 2**).

Regarding Claim 13, Papzian reference discloses a process for reacting and/or mixing of at least one fluid component within a reactor reacted and/or mixing vessel (**Abstract**) comprising at least

an outer in a direction extending vessel-like member (**Figure 1, numeral 1**),  
an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction (**Figures 1&2, numeral 3 and Page 2, Lines 20-42**), and  
at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel, said process comprising mixing or reacting a fluid within a gap between said outer and said inner member, at least one of which is of a cross-section of non- circular shape so that the gap width at a fixed position varies with the rotation of at least one of the two members (**Figure 1, numerals 10 and 13 and Figure 2, numerals 1 and 3**).

Regarding Claim 14, Papzian reference discloses the process according to claim 13, including rotating at least one of the members to generate a substantially narrow distribution of energy dissipation rate is for creating a substantially homogenous flow environment (**Page 1, Lines 81-89**).

Regarding Claim 16, Papzian reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a single or multiple phase reaction or a mixing process mixing components (**Abstract**).

Regarding Claim 19, Papzian reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a granulation and/or coagulation process of particles including granulating said particles dispersed in a fluid in said reactor and/or mixing vessel serving as a granulator or coagulator (**Abstract**).

6. Claims 1-5, 7, 9, 10, 13, 14, 16, and 19 rejected under 35 U.S.C. 102(b) as being anticipated by **M.G. Huntington (Huntington - US Patent No. 3,396,103)**.

Regarding Claim 1, Huntington reference discloses a reactor and/or mixing vessel comprising at least

an outer in a direction extending vessel-like member (**Figures 1&2, numeral 58**),

an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction (**Figure 2, numerals 36, 38**), and

at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel **(Figure 1)**.

Regarding Claim 2, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein the outer member is a cylinder having a cross-section of circular shape and the inner member does have a cross-section of non-circular shape **(Figure 2, numerals 58 - outer member and 36 and 38 - inner members)**.

Regarding Claim 3, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein the inner member is adapted for rotation with respect to the outer member **(Figure 1 and Abstract)**.

Regarding Claim 4, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein the at least one member having a cross-section of non-circular shape has a shape selected from the group consisting of an elliptic, a triangle, a square and a polygon-like shape, said shape having rounded off edges **(Figure 2, numerals 36 and 38 - octagonal and Figure 3, numeral 211)**.

Regarding Claim 5, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein at least one of the two members has at least one of a wave-like shape longitudinally extending grooves, or perforations **(Figure 2, numerals 36 & 38 - perforations)**.

Regarding Claim 7, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein the two members are arranged concentrically **(Figures 1&2)**.

Regarding Claim 9, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein at least one member has a wall which is at least partially permeable for fluid exchange of at least one component between inside and outside the reactor and/or mixing vessel (**Figure 2, numerals 32 and 34**).

Regarding Claim 10, Huntington reference discloses the reactor and/or mixing vessel according to claim 1, wherein at least one member has a permeable for filtration at least one component from the reaction mixture in the reactor and/or mixing vessel (**Abstract and Figure 2, numerals 24 and 26 – osmotic membranes**).

Regarding Claim 13, Huntington reference discloses a process for reacting and/or mixing of at least one fluid component within a reactor reacted and/or mixing vessel (**Abstract**) comprising at least

an outer in a direction extending vessel-like member (**Figures 1&2, numeral 58**),  
an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction (**Figure 2, numerals 36, 38**), and

at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel, said process comprising mixing or reacting a fluid within a gap between said outer and said inner member, at least one of which is of a cross-section of non- circular shape so that the gap width at a fixed



position varies with the rotation of at least one of the two members (**Abstract and Figure 1**).

Regarding Claim 14, Huntington reference discloses the process according to claim 13, including rotating at least one of the members to generate a substantially narrow distribution of energy dissipation rate is for creating a substantially homogenous flow environment (**Abstract**).

Regarding Claim 16, Huntington reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a single or multiple phase reaction or a mixing process mixing components (**Abstract and Column 4, Lines 14-38**).

Regarding Claim 19, Huntington reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a granulation and/or coagulation process of particles including granulating said particles dispersed in a fluid in said reactor and/or mixing vessel serving as a granulator or coagulator (**Abstract**).

7. Claims 1-4, 8, 13, 14, 16, 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by **Jean Marie Massoubre (Massoubre - US Patent No. 3,396,103)**.

Regarding Claim 1, Massoubre reference discloses a reactor and/or mixing vessel comprising at least

an outer in a direction extending vessel-like member (**Figures 1&3, numeral 11**),  
an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly

perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction **(Figure 3, numerals 36 and 37)**, and

at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel **(Figure 1, numerals 38 – inlet and 39 –outlet)**.

Regarding Claim 2, Massoubre reference discloses the reactor and/or mixing vessel according to claim 1, wherein the outer member is a cylinder having a cross-section of circular shape and the inner member does have a cross-section of non-circular shape **(Figure 3, numerals – 11 – outer member and 36 and 37 – inner members)**.

Regarding Claim 3, Massoubre reference discloses the reactor and/or mixing vessel according to claim 1, wherein the inner member is adapted for rotation with respect to the outer member **(Abstract)**.

Regarding Claim 4, Massoubre reference discloses the reactor and/or mixing vessel according to claim 1, wherein the at least one member having a cross-section of non-circular shape has a shape selected from the group consisting of an elliptic, a triangle, a square and a polygon-like shape, said shape having rounded off edges **(Figure 3, numeral 36 and 37 – oval)**.

Regarding Claim 8, Massoubre reference discloses the reactor and/or mixing vessel according to claim 1, wherein the two members are arranged eccentrically **(Figure 3 and Abstract)**.

Regarding Claim 13, Massoubre reference discloses the process for reacting and/or mixing of at least one fluid component within a reactor reacted and/or mixing vessel comprising at least

an outer in a direction extending vessel-like member (**Figures 1&3, numeral 11**),  
an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non- circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction (**Figure 3, numerals 36 and 37**), and

at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel, said process comprising mixing or reacting a fluid within a gap between said outer and said inner member, at least one of which is of a cross-section of non- circular shape so that the gap width at a fixed position varies with the rotation of at least one of the two members (**Figure 1, numeral 38 – inlet and 39 – outlet and Column 1, Lines 50-67**).

Regarding Claim 14, Massoubre reference discloses the process according to claim 13, including rotating at least one of the members to generate a substantially narrow distribution of energy dissipation rate is for creating a substantially homogenous flow environment (**Column 1, Lines 50-55**).

Regarding Claim 16, Massoubre reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a single or multiple phase reaction or a mixing process mixing components (**Column 1, Lines 50-55**).

Regarding Claim 17, Massoubre reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes polymerization or copolymerization process of monomers and/or oligomers within a reactor (**Abstract**).

Regarding Claim 19, Massoubre reference discloses the process according to claim 13, wherein said mixing or reacting a fluid executes a granulation and/or coagulation process of particles including granulating said particles dispersed in a fluid in said reactor and/or mixing vessel serving as a granulator or coagulator (**Column 1, Lines 24-28**).

#### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Arto Edward Papzian ( Papzian - GB 2 103 229 A), M.G. Huntington (Huntington - US Patent No. 3,396,103) or Jean Marie Massoubre (Massoubre - US Patent No. 3,396,103)**

Regarding Claim 11, Papzian, Huntington or Massoubre reference discloses the reactor and/or mixing vessel according to claim 1 except for the ratio of width of the largest gap to the smallest gap within the range of 1.2 to 3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the claimed ratio or width of the largest gap to the smallest gap, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding Claim 12, Papzian, Huntington or Massoubre reference discloses the reactor and/or mixing vessel according to claim 1, wherein the ratio between the

average diameter of the outer member to the smallest gap width between the two members is within the range of 5 to 20. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the claimed ratio between the average diameter of the outer member to the smallest gap width between the two members, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

12. Claims 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **M.G. Huntington (Huntington - US Patent No. 3,396,103) in view of Shmidt et al. (US Patent No. 4,911,847)**.

Regarding Claims 15 and 18, Huntington reference discloses the process according to claim 13 except for said fluid includes components which are used to carry out biochemical or bioreactions within the reactor and/or mixing vessel or said mixing or reacting a fluid executes a biochemical or bioreaction of at least one biochemical component within a reactor. Shmidt et al. reference discloses a process for filtering out the bacteria used a reverse osmosis desalination system such as the apparatus of Huntington (**Column 2, Lines 20-68**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the process of Huntington for carrying out biochemical or bioreactions since it was known in the art to use a reverse osmosis desalination system such as the apparatus of Huntington for filtering out the bacteria.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY-TRAM NGUYEN whose telephone number is (571)270-3167. The examiner can normally be reached on MON- THURS: 6:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Huy-Tram Nguyen/  
Examiner, Art Unit 1774